Chapter 1
Introduction

Background

Today the most widespread source of lead exposure in the environment of U.S. children is lead-based paint that was applied to residential buildings before the 1978 ban on residential leaded paint by the Consumer Product Safety Commission. Lead was a major ingredient in most interior and exterior oil paints prior to 1960, with some paints containing as much as 50 percent lead in dry weight. Lead was widely used as pigment because its different forms could produce a wide variety of colors, and it improved the physical properties of the paint. Exposure to lead in paint can come from the paint chips themselves, from dust caused by abrasion of paint on friction surfaces, or from chalking of exterior paint. The U.S. Department of Housing and Urban Development (HUD) estimates that 83 percent of pre-1980 residential housing structures contain some lead-based paint.[1] The likelihood, extent, and concentration of lead-based paint vary with the age of the building.

The Lead-Based Paint Poisoning Prevention Act of 1971, as amended by the Housing and Community Development Act of 1987, established 1.0 milligram of lead per square centimeter of surface area (mg/cm^2) as the federal threshold requiring abatement of lead-based paint on architectural components in public and Indian housing developments nationwide. The Residential Lead-Based Paint Hazard Reduction Act of 1992 (commonly referred to as "Title X") mandated the evaluation and reduction of lead-based paint hazards in the nation's existing housing. Title X also established 0.5 percent lead by weight as an alternative to the 1.0 mg/cm^2 threshold. An U.S. Environmental Protection Agency (EPA) study[2] found that a level of 1.0 mg/cm^2 was roughly equivalent to 1.0 percent by weight and a level of 0.5 percent by weight was roughly equivalent to 0.5 mg/cm^2.

The management of wastes generated from lead-based paint abatement activities are governed by the Resource Conservation and Recovery Act (RCRA) of 1976 and provisions contained in 40 CFR Parts 260-268. RCRA classifies any waste that leaches 5 milligrams per liter (mg/L) of lead or more (as determined by a Toxicity Characteristic Leaching Procedure[3]) a hazardous waste. The leachability of lead is affected by various factors, including speciation of the metal, pH of the leachate, particle size, acid flux through the waste, and time of contact with the leachant. The U.S. Environmental Protection Agency (EPA) has promulgated a list of Best

Demonstrated Available Technologies (BDAT) for the inorganic stabilization of hazardous wastes including lead-containing wastes.[4] Stabilization includes those techniques that limit the solubility of hazardous constituents in the waste.[4] Much of the inorganic stabilization that occurs in the United States is based on the chemistry of lime or ordinary Portland cement.

EPA is sponsoring a program aimed toward the reduction of lead emissions in the environment from demolition and renovation projects in commercial buildings, nonindustrial structures, and residential dwellings. As part of this program, the U.S. Army Construction Engineering Research Laboratories (USACERL) and EPA's National Risk Management Research Laboratory (NRMRL) conducted this study to evaluate a paint removal technology combined with two lead-based paint waste stabilization technologies.

Objective

The overall objective of this study was to demonstrate the effectiveness of a wet abrasive blasting technology combined with an inorganic-based stabilization technology to remove lead-based paint from exterior substrates (wood and brick) and to generate a non-hazardous waste for disposal. The specific objectives of this study are:

- Evaluate the effectiveness of wet abrasive blasting (Torbo®) with an abrasive lead-stabilizer additive (Blastox®) and wet abrasive blasting (Torbo®) on a surface preparation coating lead-stabilizer (PreTox 2000 Fast Dry) to remove lead-based paint from exterior brick and wood substrates to achieve a lead loading (i.e., mass of lead in a given surface area on the substrate) of <1 mg/cm^2.

- Evaluate the effectiveness of an abrasive additive (Blastox®) and surface preparation coating (PreTox 2000 Fast Dry) to stabilize the lead in paint abrasive media waste to reduce the leachable lead to below the RCRA regulatory threshold of 5 mg/L.

- Evaluate the potential for each technology combination (e.g., Torbo® with Blastox®) to generate airborne lead particulate levels in excess of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Level (PEL) of 50 $\mu g/m^3$, 8-hour time-weighted average (TWA).

- Develop estimates of the cost of lead-based paint removal and disposal using these technologies.